

AVX PRODUCT GUIDE FOR AUTOMOTIVE APPLICATIONS

AUTOMOTIVE QUALIFIED

CERAMIC CAPACITORS | TANTALUM CAPACITORS | POLYMER CAPACITORS |
NIOBIUM OXIDE | FILM CAPACITORS | CONNECTORS | MULTILAYER VARISTORS |
NTC THERMISTORS | TIMING DEVICES



AUTOMOTIVE APPLICATIONS

ABOUT AVX

AVX is an industry leader in the manufacture and supply of Passive electronic components and connectors. Our worldwide manufacturing capability includes facilities located in seventeen countries in four continents, allowing us to continue meeting customer needs on a global basis.

As a technology leader, AVX will continue to add to its product portfolio on a regular basis. Details of new devices being offered and their specifications will be shown on the AVX website, www.avx.com

	SAFETY							BODY ELECTRONICS													
	Airbag	Anti-Lock Brake System	Crash Avoidance Circuit	Tire Pressure	Traction Control (ESP)	Seat Weight Sensor	V2X Communications	Small Motor Drives (e.g. Windows)	Communication Bus (LIN, CAN, FlexRay)	Transponders	Dashboard Systems	Car Alarm	Lamp/LED Driver	HID Lighting	Windshield Wipers	Rain Sensor	Light Sensor	Engine Control Unit (ECU)	Electronic Clutch	Fuel Pump	Water Pump
Ceramic Capacitors																					
NP0	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•
X7R	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•
X7R High Voltage														•							
High Temperature X8R																					
FLEXITERM®	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•
FLEXISAFE™	•	•	•		•																
U Series				•			•		•												
IPC Array	•	•								•								•			
ESD-Safe™					•	•			•	•	•							•			
Radial and Axial Capacitor								•							•					•	•
X7R Feedthru			•		•		•	•	•								•	•			
Tantalum Capacitors																					
TAJ / F93-AJ6				•		•	•	•	•	•	•	•	•		•	•	•	•	•	•	•
TPS / F91-AJ6						•	•	•		•	•	•	•					•	•	•	•
TRJ / F97	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
TRM		•			•			•													
TMJ				•																	
THJ		•												•				•	•		
Conductive Polymer Capacitors																					
TCQ						•		•	•	•	•	•	•		•	•	•				
Niobium Oxide - OxiCap®																					
NOJ	•		•	•		•	•		•		•	•	•			•	•			•	•
NOS			•							•	•									•	•
NOM											•										
Film Capacitors																					
PPS Film Chip																					
PEN Film Chip	•							•					•		•						
PET-HT Film Chip	•							•					•	•	•						
FFV / FFLI / Custom parts																					
FAV																					
Circuit Protection																					
Automotive TransGuard®	•				•	•		•	•	•	•	•	•		•	•	•	•	•	•	•
Communication Bus Varistor		•	•		•				•	•	•	•	•					•	•		
Automotive StaticGuard		•		•		•	•			•	•	•				•					
Automotive AG/Sub pF AG							•		•	•						•	•				
Controlled Capacitance				•					•	•					•						
High Temperature Varistors																		•			
Miniature AC Varistors									•	•											
Radial Varistors								•												•	•
CapGuard								•							•					•	•
Glass Encapsulated Varistors	•				•										•				•	•	•
Automotive TransFeed			•								•								•		
NTC Thermistors																					
SMT Thermistors						•					•		•					•			
Leaded Thermistors						•					•									•	•
Connectors																					
IDC						•		•				•	•								
FFC/FPC											•	•	•				•	•			
Board to Board													•								
SDIO													•								
Custom Automotive	•	•	•		•	•		•		•	•	•	•	•	•	•	•	•	•	•	•
Timing Devices																					
Timing Devices	•	•	•	•	•		•		•	•	•	•			•			•		•	

PRODUCT OVERVIEW



SMT CERAMIC CAPACITORS


Product	Description	Dielectric	Operating Temp	Range
Tin Termination				
	AVX Ceramic Capacitors exhibit low parasitics and excellent EMI filtering capabilities. AVX MLC Capacitors are available in wide range of values, styles, voltage ratings and dielectrics. Ultra Low ESR NPO - "U" dielectric parts are designed for RF applications requiring ultra-low ESR. NPO parts are suitable for use in MHz range with very stable characteristics. X7R parts are suitable for use for use in general kHz range. X8R/X8L parts are designed for high temperature applications up to +150°C. (*Contact AVX for +150°C X7R option)	Ultra Low ESR NPO	+125°C	50V - 200V 0.2pF - 1.0nF
		NPO	+125°C	25V - 100V 1pF - 4.7nF
		X7R	+125°C	16V - 500V 220pF - 22µF
		X7R High Voltage	+125°C	600V - 3000V 100pF - 0.15µF
		X8R/X8L/X7R*	+150°C	25V - 100V 330pF - 4.7µF
FLEXITERM®				
	MLC Capacitors equipped with an AVX flexible termination system - FLEXITERM®. Capacitors have superior resistance to both - mechanical stress (board flexure - 5mm bend test guaranteed) and thermal stress (increased temperature cycling performance, 3000 cycles and beyond). (*Contact AVX for +150°C X7R option)	X7R	+125°C	16V - 200V 270pF - 22µF
		X7R High Voltage	+125°C	600V - 3000V 100pF - 0.15µF
		X8R/X8L/X7R*	+150°C	25V - 100V 330pF - 4.7µF
FLEXISAFE				
	Specifically designed with an industry leading set of safety features for safety critical applications. Combines FLEXITERM™ layer in conjunction with the cascade design.	X7R	+125°C	16V - 100V 1nF - 470nF
ESDSafe				
	Enhanced MLC capacitor designed specifically for general ESD protection.	X7R	+125°C	25V - 100V 4.7nF - 2.2µF
IPC Array				
	Capacitor array is an Integrated Passive Component (IPC) and associates up to four capacitance elements in a single case and is ideal for use in modern integrated circuits in automotive applications. It offers PCB space saving, increased assembly line output and better electrical performance thanks to small dimensions. Available also with FLEXITERM® for X7R and X8R range.	NPO	+125°C	16V - 100V 1pF - 470pF
		X7R	+125°C	10V - 100V 220pF - 100nF
		X8R	+150°C	16V 220pF - 680pF
EMI Filter				
	Capacitor with excellent filtering capability thanks to the feedthru L-C-T like filter design.	NPO and X7R	+125°C	50V - 100V 22pF - 47nF

LEADED CERAMIC CAPACITORS


Product	Description	Dielectric	Operating Temp	Range
Radial				
	AVX leaded MLCCs offer excellent mechanical shock and vibration resistance in harsh environment applications. With a wide range of dielectric materials, capacitance values, voltage ratings and lead styles, leaded capacitors offer robust mechanical shock and vibration characteristics, exceptional thermal resistance and proven reliability and quality. Both dipped and molded configurations available	NPO	+125°C	50V - 200V 1pF - 8200pF
		X7R	+125°C	50V - 100V 470pF - 10µF
		X7R High Voltage	+125°C	1000V - 3000V 470pF - 10nF
		X8R	+150°C	50V 1nF - 330nF
Axial				
	Axial version of the leaded epoxy coated capacitors. Both dipped and molded configurations available.	X7R	+125°C	50V 10nF - 4.7µF

NOTICE: Specifications are subject to change without notice. Contact your nearest AVX Sales Office for the latest specifications. All statements, information and data given herein are believed to be accurate and reliable, but are presented without guarantee, warranty, or responsibility of any kind, expressed or implied. Statements or suggestions concerning possible use of our products are made without representation or warranty that any such use is free of patent infringement and are not recommendations to infringe any patent. The user should not assume that all safety measures are indicated or that other measures may not be required. Specifications are typical and may not apply to all applications.


TANTALUM CAPACITORS

Product	Description	Series	Operating Temp	Range
Tantalum Capacitors				
 <p>AVX automotive tantalum capacitors offer high ripple and surge current capability and resistance against thermo-mechanical stresses.</p> <p>Parts are available in standard and low ESR options and also in high temperature series up to +175°C while respecting the requirements for high reliability which make them suitable for a wide range of automotive control circuits in applications such as engine control units, ABS systems, MDPS, electronic gearboxes, TPMS, etc.</p>	TAJ	+125°C	6.3V - 50V 0.22µF - 680µF	
	F93-AJ6	+125°C	4V - 35V 1µF - 680µF	
	TPS	+125°C	6.3V - 50V 0.22µF - 680µF	
	F91-AJ6	+125°C	6.3V - 16V 10µF - 100µF	
	TRJ	+125°C	4V - 50V 0.1µF - 680µF	
	F97	+125°C	6.3V - 35V 0.33µF - 150µF	
	TRM	+125°C	2.5V - 50V 4.7µF - 1500µF	
	TMJ	+125°C	6.3V - 50V 0.22µF - 680µF	
	THJ +175°C	+175°C	6.3V - 50V 0.1µF - 220µF	

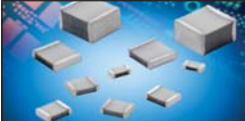

CONDUCTIVE POLYMER CAPACITORS

Product	Description	Series	Operating Temp	Range
Conductive Polymer Capacitors				
 <p>Automotive polymer series of low ESR capacitors. Qualified in accordance to AEC-Q200.</p>	TCQ	+105/125°C	4V - 50V 10µF - 220µF	







NIOBIUM OXIDE CAPACITORS

Product	Description	Series	Operating Temp	Range
Niobium Oxide Capacitor – OxiCap®				
 <p>AVX NbO OxiCap® capacitors offer unique features - high reliability, non-burn and non smoke technology, more resistance to overvoltage breakdown, lower recommended derating, high resistance failure mode. NbO OxiCap® capacitors suits well application where reliability and safety is of primary focus, such as automotive.</p>	NOJ	+105°C	1.8V - 10V 4.7µF - 1000µF	
	NOS	+125°C	1.8V - 8V 10µF - 1000µF	
	NOM	+125°C	1.8V - 6.3V 220µF - 680µF	


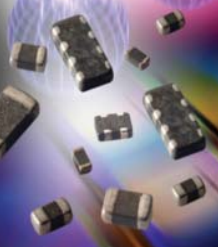


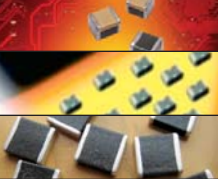

FILM CAPACITORS

Product	Description	Dielectric	Operating Temp	Range
Film Chip Capacitors				
 <p>The self-healing property of film dielectric provides an open failure mode capacitor with excellent reliability. The intrinsic characteristic of film provides a capacitor that exhibits low DC bias, excellent thermal behavior and thermal shock resistance, no piezo effect and low ESR, ESL and dissipation factor.</p>	PPS	+125°C	16V - 50V 1nF - 180nF	
	PEN	+125°C	25V - 630V 0.01µF - 4.7µF	
	PEN-HT	+125°C	63V - 630V 0.01µF - 4.7µF	
Medium Power Film				
 <p>FFV, FFLI and Custom parts are medium power film capacitors for DC filtering, high rms current and high temperature automotive applications.</p> <p>FAV series are high reactive energy tuning capacitors for HEV/EV battery charging applications.</p>	FFV Series (PET/PPY)	+105°C	300V - 1900V 22µF - 400µF	
	FFLI (PPY)	+95°C	800V - 1400V 105µF - 3mF	
	Custom Parts (PPY)	+105°C	75V - 1400V 300µF - 1.5mF	
	FAV (PPY)	+85°C	300 - 650Vrms 80nF - 1.2mF	





CONNECTORS

Product	Series	Description	Range
	Custom Automotive Connectors	Advanced component, process and automation technology provides high pin and component (Mechatronics) count connector and module solutions for emerging automotive systems; engine management, braking, steering, safety, environmental, etc.	Designed based on customer requirements
	IDC	Provides reliable "Gas Tight" wire-to-board connections for high temperature, shock and vibration applications	AWG: 12-30 SMT and PTH
	Board-to-Board	Fine pitch, vertical board-to-board connectors.	20-120 pos 3-9mm stacking height
	Secure Locking FFC/FPC	FFC/FPC cables connectors with secure locking mechanism.	8-80 positions right angle and vertical types
	High Speed FFC/FPC	FFC/FPC cables connectors for high data speed.	24-51 positions right angle
	SDIO	SDIO connectors for SD memory cards with push-push spring eject mechanism.	Reverse and normal mount type 2.7-2.9mm connector max height

CIRCUIT PROTECTION

Product	Series	Description	Operating Temp	Range
Automotive Series Multilayer Varistors				
	Automotive TransGuard®	Wide range of varistors for overvoltage protection with EMI/RFI filtering function in the off state.	+125°C	3.3Vdc - 85Vdc 0.05J - 13J
	Automotive StaticGuard	Lower capacitance version of TransGuard® for general ESD and CMOS protection.	+125°C	18Vdc 40 - 80pF
	Communication Bus Varistors	Low capacitance varistors for protection of CANBus, FlexRay, data lines etc.	+125°C	18, 32Vdc 15 - 37pF
	Automotive AntennaGuard	Low capacitance varistors for applications such as Antennas, RF, high-speed data links etc.	+125°C	18 - 30Vdc 1.5 - 12pF
	Automotive Sub pF AntennaGuard	UltraLow capacitance varistors for applications such as sensors, RF, HDMI, high-speed data links.	+125°C	16Vdc 0.8pF
	Controlled Capacitance	Varistors with controlled capacitance for circuit protection and targeted EMI filtering.	+125°C	22 - 30Vdc 33 - 82pF
	Miniature AC Varistor	Varistors designed for low power AC, LC resonant circuits, and higher DC data lines protection.	+125°C	70Vdc/52Vac 6 - 22pF
	Automotive High Temperature	Varistors designed for use in high temperature environment, under-hood applications etc.	+150°C	18, 32Vdc 12 - 22pF
	Radial Automotive Varistors	Radial epoxy coated part for radial mounting, harsh environment, available also in high-temp series.	+125°C +150°C	14 - 48Vdc 0.1 - 2.0J
	CapGuard™	Combines advantages of varistor and high capacitance MLC capacitor in single component for overvoltage protection and enhanced EMI/RFI filtering.	+125°C	26, 45Vdc 0.47, 1.0µF
	Automotive TransFeed	Varistor with Feedthru construction for ESD suppression and enhanced EMI filtering.	+125°C	5.6 - 26Vdc 0.05 - 0.3J
	Glass Encapsulated	Glass encapsulated varistors designed for high energy or harsh environment applications.	+125°C	16 - 85Vdc 0.6 - 13.8J
NTC Thermistors				
	SMT Series	SMT thermistors for temperature measurement and temperature compensation.	+150°C	R: 10Ω - 1MΩ
	Disc Thermistors	Disc thermistors for temperature measurement and temperature compensation.	+150°C	R: 68Ω - 1MΩ
	High Accurate Series	Highly accurate thermistors for temperature sensing with tolerances from +/-1%.	+150°C	R: 2kΩ - 0.1MΩ

TIMING DEVICES

Product	Series	Description	Operating Temp	Range
	Crystals	Crystal units for automotive applications They are enclosed in a sealed package and oscillate when connected to an oscillation circuit.	+85°C +125°C +150°C	4MHz -54MHz
	Oscillators	Clock oscillators combine semiconductor and quartz crystal units, and emit an oscillation signal when power is switched on.	+85°C +105°C +125°C	1.5MHz - 160MHz
	TCXO	Temperature compensated crystal oscillator (TCXO) to provide highly stable output frequency.	+70°C +75°C +85°C +105°C	13MHz - 52MHz
	Resonators	Miniaturized, high-performance ceramic resonators are used as standard clocks for microprocessors.	+85°C +125°C +150°C	4MHz - 20MHz

AMERICAS

AVX Greenville, SC

864-967-2150

EUROPE

AVX Limited, England
AVX S.A.S., France
AVX GmbH, Germany
AVX SRL, Italy
AVX Czech Republic
AVX/ELCO UK
ELCO Europe GmbH
AVX S.A., Spain
AVX Benelux

+44-1276-697000
+33-1-69-18-46-00
+49-0811-95949-0
+39-02-614-571
+420-57-57-57-521
+44-1638-675000
+49-2741-299-0
+34-91-63-97-197
+31-187-489-337

ASIA-PACIFIC

AVX/Japan
AVX/Kyocera (S) Pte Ltd., Singapore
AVX/Kyocera, Asia, Ltd., Hong Kong
AVX/Kyocera Yuhan Hoesa, South Korea
AVX/Kyocera HK Ltd., Taiwan
AVX/Kyocera (M) Sdn Bhd, Malaysia
AVX/Kyocera International Trading Co. Ltd., Shanghai
AVX/Kyocera Asia Ltd., Shenzhen
AVX/Kyocera International Trading Co. Ltd., Beijing
AVX/Kyocera India Liaison Office

+81-740-32-1250
+65-6286-7555
+852-2363-3303
+82-2785-6504
+886-2-2656-0258
+60-4228-1190
+86-21-3255 1933
+86-755-3336-0615
+86-10-6588-3528
+91-80-6450-0715

ASIA-KED

(KYOCERA Electronic Devices)
KED Hong Kong Ltd.
KED Hong Kong Ltd. Shenzhen
KED Company Ltd. Shanghai
KED Hong Kong Ltd. Beijing
KED Taiwan Ltd.
KED Korea Yuhan Hoesa, South Korea
KED (S) Pte Ltd. Singapore
Kyocera Corporation - Japan

+852-2305-1080/1223
+86-755-3398-9600
+86-21-3255-1833
+86-10-5869-4655
+886-2-2950-0268
+82-2-783-3604/6126
+65-6509-0328
+81-75-604-3449



A KYOCERA GROUP COMPANY
<http://www.avx.com>